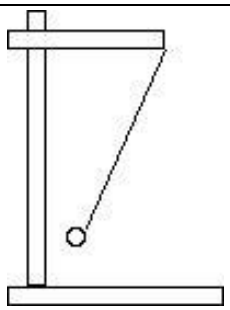
Name: _____ Period: _____

PHYSICS: PENDULUM LAB



Problem: What are the factors affecting the swing of the pendulum?

For all the experiments, you will be using the same pendulum equipment which includes a wooden stand, pendulum body, string, washers, and a photogate.

The time it takes the pendulum to swing back and forth once is called the **period**.
Time 5 back-and-forth swings and then divide by 5 to get a more accurate value for the period.

Experiment #1: Mass

a. Hypothesis:

b. Procedure:
   1. Using the pendulum equipment, add an additional washer to the pendulum for each trial. Maintain the same length of string and the angle of the swing for each trial. Use the PERIOD mode on the photogate.

Trial	Number of washers (mass - g)	Time (seconds)	Time (seconds)	Time (seconds)	Average time 5 swings (seconds)	Period (seconds)
1	1					
2	2					
3	3					
4	4					
5	5					
6	6					
7	7					
8	8					
9	9					
10	10					

Experiment #2: Angle of swing - **amplitude** (the angle between the rest position and where the end of the swing is located.)

a. Hypothesis:

b. Procedure:

1. Using the pendulum equipment, change the angle of each swing. The angle will correspond to the beginning amplitude or height of each swing. Maintain the same length of string and use three washers. Use the PERIOD mode on the photogate.

Trial	Angle of release (degrees)	Time (seconds)	Time (seconds)	Time (seconds)	Average time 5 swings (seconds)	Period (seconds)
1	5					
2	10					
3	15					
4	20					
5	25					
6	30					

Experiment #3: Length of String

a. Hypothesis:

b. Procedure

1. Using the pendulum equipment, change the length of the string of each swing. Maintain the same angle of each swing and use three washers. Use the PERIOD mode on the photogate.

Trial	Length of String (centimeters)	Time (seconds)	Time (seconds)	Time (seconds)	Average time 5 swings (seconds)	Period (seconds)
1	10					
2	20					
3	30					
4	40					
5	50					
6	60					
7	70					
8	80					
9	90					

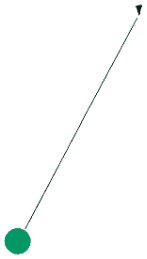
Name: _____ Period: _____

PENDULUM LAB: CONCLUSION

1. How many of your hypotheses matched the collected data? If any did match, which experiment?

2. Of the three variables changed throughout this lab, which variable has the most effect on the time of the pendulum's swing?

A pendulum is made of a length of string tied to a mass. The pendulum is allowed to swing back and forth freely. The time needed for the mass to make one back-and-forth round trip is called the period of the pendulum. The table below shows the results of a pendulum experiment in which first the mass was changed, then the length of the pendulum string.



Length (cm)	Mass (g)	Period (seconds)
10	30	0.75
10	60	0.75
20	30	1
20	60	1

3. _____ The experimental results suggest that the period of a pendulum is affected by
   a. Its mass only
   b. Its length only
   c. Both its mass and its length
   d. Neither its mass nor it length

4. _____ To decrease the period of the pendulum in the previous question (that is to decrease the time for one full swing, or to make it swing faster), one needs to
   a. Increase the mass
   b. Decrease the mass
   c. Increase the length and mass
   d. Decrease the mass and length

5. _____ Based on the results of the experiment, how would you adjust this pendulum clock when it runs slow?
   a. slide the mass upward on the pendulum rod
   b. Move the mass downward on the pendulum rod
   c. Adjust the smoothness of the mass on the rod
   d. Change the weight of the mass